REMARKS

The Final Office Action mailed March 4, 2004, has been carefully reviewed and, by this Amendment, claims 2 and 3 have been canceled, and claim 1, 9 and 10 have been amended. Claims 1 and 4-10 are pending in the application.

The Examiner objected to the specification as containing informalities which Applicants have corrected herein.

The Examiner rejected claims 1-10 under 35 U.S.C. 112, second paragraph, as being indefinite, and maintained her rejection of claims 1-10 under 35 U.S.C. 103(a) as being unpatentable over applicant's admitted prior art in combination with U.S. Publication No. 2003/0003683 to Ko et al. ("Ko") and U.S. Publication No. US 2002/0090832 to Koh et al. ("Koh").

As set forth in claim 1, which has been amended to include the limitations of claims 2 and 3, now canceled, the present invention is directed to a method for fabricating a semiconductor memory device, comprising the steps of depositing first and second insulating layers on a semiconductor substrate having a predetermined shallow trench isolation (STI) region and a predetermined deep trench isolation (DTI) region. The STI region is formed, in the predetermined region for STI, by selectively etching the second and first insulating layers and the semiconductor substrate, after which a photoresist is formed to cover the STI region and expose the region predetermined to be a DTI region. The surface of the photoresist is then cured by implanting high energy argon ions or through an e-beam process, with the implanting

concentration of argon ions being $10^{12\sim15}$ cm^3 and the implanting energy of argon ions being 10~200KeV. Thereafter, the DTI region is formed by using only the cured photoresist and the second insulating layer as a mask. As explained in the specification, the need for a third insulating layer or hard mask is thus eliminated, which simplifies the fabrication process and reduces production cost.

As Applicants argued in the previous Amendment filed December 11, 2003 ("Applicants' December Amendment"), Ko discloses a method for increasing etch sensitivity of photoresist material but does not disclose or suggest *the implantation of argon ions to cure the photoresist* as claimed by the present invention. Instead, Ko teaches a photoresist containing a composition of silicon which is hardened through reaction with an atmosphere containing oxygen or nitrogen (see paragraphs 0030 and 0031). *Argon,* to the extent it may be present, *is an inactive carrier gas* used to introduce the nitrogen and oxygen containing gases that actually react with the substrate (see paragraph 0037, last sentence).

The Examiner has stated in the current Action, in response to Applicants' December Amendment and the arguments therein which were along the lines just presented, that Ko is not being relied upon to teach the implantation of argon ions. This statement is not understood, however, in that the Examiner then goes on to state that Ko is being relied upon for disclosing "curing a surface [of] the photoresist with argon gas (Figure 3, and Paragraph 0032, lines 7-13)". Thus, it *does* appear that the Examiner is relying upon Ko for the step of curing the photoresist with argon gas. And, as just explained in the previous paragraph, Ko does not

provide this teaching; in Ko it is the nitrogen or oxygen containing gas which cures the photoresist, *not* the presence of any argon gas that may be there as a carrier gas.

Koh, on the other hand, teaches a method for removing defects between an anti-reflective coating layer and a photoresist by forming a carbonized layer *on the top surface of the organic anti-reflective coating through the evaporation of solvents in such anti-reflective coating layer*. While the carbonized layer is formed using a curing process such as ion implantation or e-beam curing, there is nothing to suggest the use of argon ion implantation or e-beam processing *to cure the photoresist itself*, as claimed by the present invention.

Furthermore, since Ko clearly requires a nitrogen or oxygen containing gas to react with the silicon substrate (see, e.g., paragraphs 0013, 0015, 0025, 0030, 0031 0037, etc.) to cure the photoresist, there can be no suggestion to modify Ko to employ the argon ion implantation/e-beam curing process of Koh, as is apparently suggested by the Examiner. Rather, to modify Ko with this aspect of Koh would render Ko inoperative, in that the latter *requires* the oxygen or nitrogen environment to effect the substrate surface reaction for the hardening of the top layer of the photoresist. Thus, the prior art cannot logically be combined in the manner being relied upon to reject the present invention and hence, for at least the foregoing reasons, the present invention is not suggested by the prior art but is patentable thereover. Accordingly, favorable reconsideration and allowance of claim 1 is requested.

Claims 4-10 are also in condition for allowance as claims properly dependent on an allowable base claim and for the subject matter contained therein.

No new issues being raised herein, and the amendments placing the application into condition for allowance, entry of the foregoing Amendment is proper after Final Action and is respectfully requested.

Should the Examiner have any questions or comments, the Examiner is cordially invited to telephone the undersigned attorney so that the present application can receive an early Notice of Allowance.

Respectfully submitted,

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Date: June 4, 2004
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